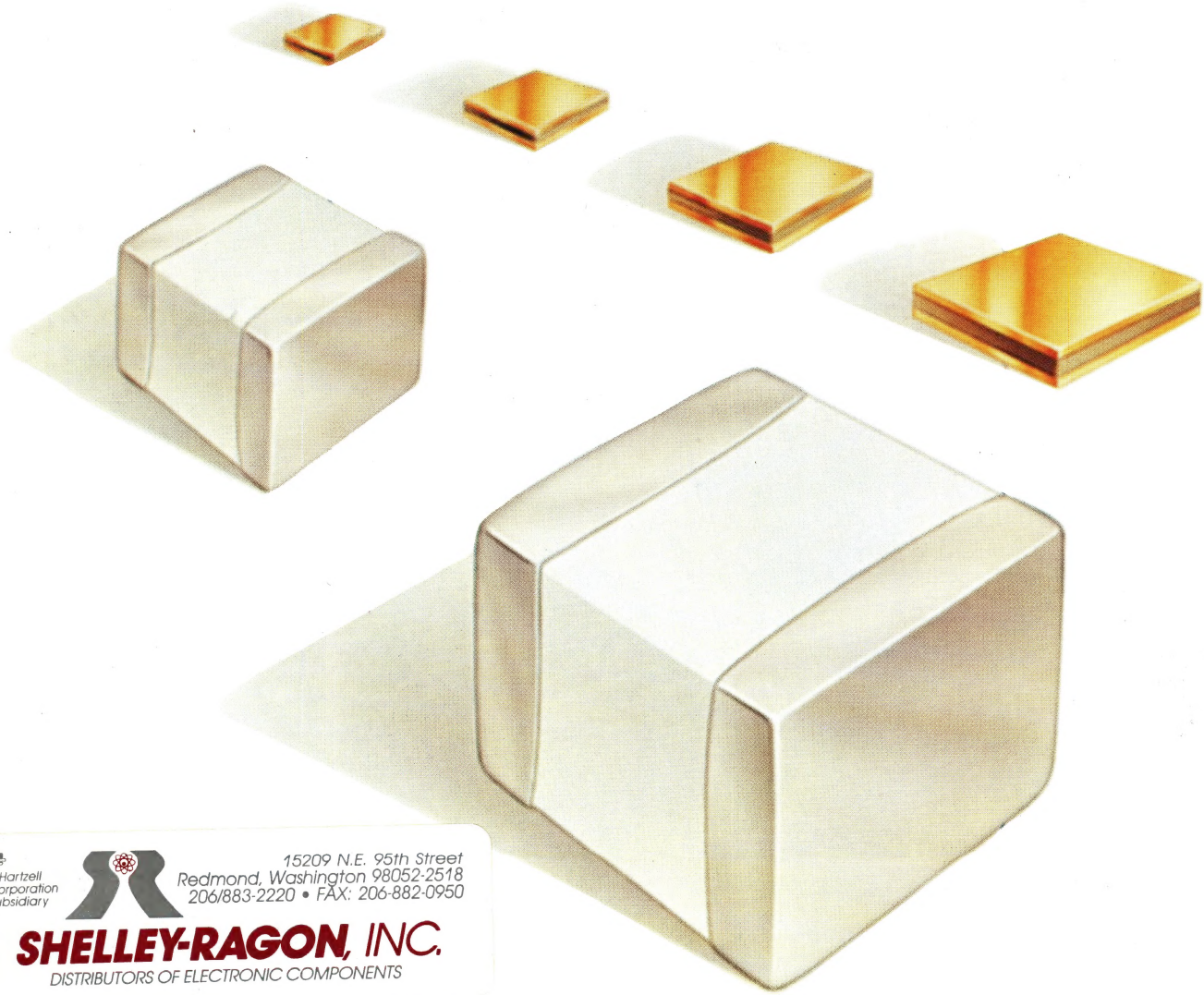
AVX

RF/MICROWAVE CHIP CAPACITORS



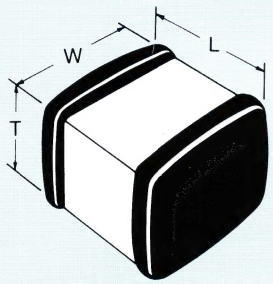
AVX CORPORATION

Microwave MLCs

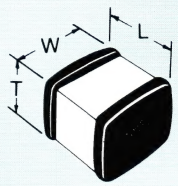
These porcelain and ceramic dielectric multilayer capacitor (MLC) chips are best suited for RF/Microwave applications typically ranging from 400 MHz to 4.2 GHz. Characteristic is a fine grained, high density, high purity dielectric material impervious to moisture with heavy internal palladium electrodes.

These characteristics lend well to applications requiring:

1) high current carrying capabilities;
2) high quality factors;
3) very low equivalent series resistance;
4) very high series resonance; and
5) excellent stability under stresses of changing voltage, frequency, time and temperature.



Approx. L x W x T
L = .110"/2.8mm
W = .110"/2.8mm
T = .100"/2.5mm

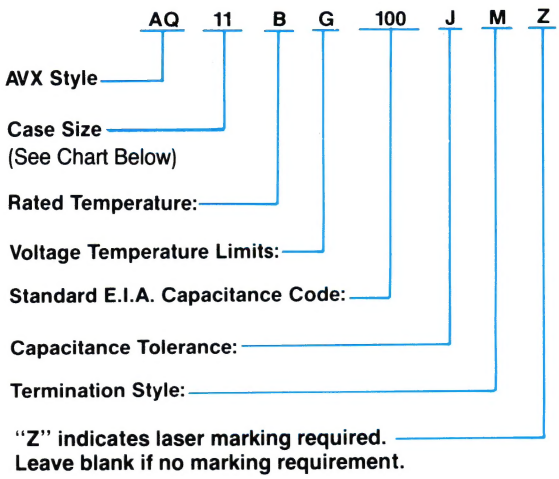


Approx. L x W x T
L = .055"/1.4mm
W = .055"/1.4mm
T = .050"/1.3mm

HOW TO ORDER

AVX Style:
AQ 11, AQ 12, AQ 13, AQ 14

Part Number Example



Packaging:
Bulk, Waffle, Tape and Reel per EIA RS 481

Part Number Codes

Rated Temperature:
B = -55°C to +125°C

Voltage Temperature Limits:
G = P090 ±20ppm/°C
P = NPO ±30ppm/°C

Standard E.I.A. Capacitance Code:
0R1 = 0.1 pF
1R0 = 1.0 pF
100 = 10 pF
101 = 100 pF
102 = 1000 pF

Capacitance Tolerance:
B = ±.1 pF
C = ±.25 pF
D = ±.5 pF
F = ±1%
G = ±2%
J = ±5%
K = ±10%
M = ±20%

Termination Style:
M = Palladium Silver
N = Silver, Nickel, Gold
U = Base Metalization - Barrier Metal - Solder Coated

MECHANICAL DIMENSIONS

Dimensions: Inches (Millimeters)

Case	Length	Width	Thickness	Band Width	Avail. Term.
11	.055±.015 (1.40±.381)	.055±.015 (1.40±.381)	.020/.057 (.508/1.45)	.010 +.010 -.005 (.254 +.254 -.127)	M, N
12	.055±.025 (1.40±.635)	.055±.015 (1.40±.381)	.020/.057 (.508/1.45)	.010 +.010 -.005 (.254 +.254 -.127)	U
13	.110±.020 (2.79±.508)	.110±.020 (2.79±.508)	.030/.102 (.762/2.59)	.015±.010 (.381±.254)	M, N
14	.110 +.035 -.020 (2.79 +.889 -.508)	.110±.020 (2.79±.508)	.030±.102 (.762±2.59)	.015±.010 (.381±.254)	U

Microwave MLCs

ELECTRICAL SPECIFICATIONS

Capacitance Range	0.3 pF to 1000 pF
Capacitance Tolerance	±0.1 pF to ±20%
Temperature Coefficient	(BG) P090 ±20PPM/°C and (BP) NPO ±30PPM/°C
Operating Temperature	-55°C to +125°C
Quality Factor	Greater than 10,000 at 10 MHz
Insulation Resistance	Per MIL-C-55681 10^6 megohm to 470 pF @ +25°C 10^5 megohm to 470 pF @ +125°C 10^5 megohm above 470 pF @ +25°C 10^4 megohm above 470 pF @ +125°C
Aging and Piezoelectric Effects	None
Dielectric Withstanding Voltage	2.5 × rated voltage

ENVIRONMENTAL CHARACTERISTICS

Will meet end-performance characteristics as outlined in MIL-C-55681B/4.

REQUIREMENT	MIL-STD-202 METHOD
Life	108, Condition F
Shock	213, Condition J
Vibration	204, Condition B
Immersion	104, Condition B
Salt Spray	101, Condition B
Solderability	208
Thermal Shock	107, Condition B
Terminal Strength	211
Temperature Cycling	102, Condition C
Moisture Resistance	106
Barometric Pressure	105, Condition B
Resistance to Soldering Heat	210, Condition C

Quality Factor VS. Frequency (Typical)

Capacitance	@ 30 MHz	@ 150 MHz	@ 500 MHz	@ 1000 MHz
1 pF	30000	4000	800	350
10 pF	9000	2000	400	150
30 pF	5000	800	200	60
100 pF	2800	400	70	25
200 pF	1500	250	40	12

Capacitance and Size VS. Self Resonant Frequency (Typical)

Dimensions: Inches (Millimeters)

Size	1 pF	10 pF	50 pF	100 pF
.055 x .055 x .050 (1.40 x 1.40 x 1.40)	9.6 GHz	3.2 GHz	1.5 GHz	1.0 GHz
.110 x .110 x. 100 (2.79 x 2.79 x 2.79)	6.4 GHz	2.2 GHz	1.0 GHz	0.7 GHz

Microwave MLCs

AVAILABLE CAPACITANCE/SIZE/WVDC/T.C.*

TABLE I: Case Size 11 and 12

Dimensions: Inches (Millimeters)

Case	Length	Width	Thickness	Band Width	Avail. Term.
11	.055±.015 (1.40±.381)	.055±.015 (1.40±.381)	.020/.057 (.508/1.45)	.010+.010-.005 (.254+.254-.127)	M, N
12	.055±.025 (1.40±.635)	.055±.015 (1.40±.381)	.020/.057 (.508/1.45)	.010+.010-.005 (.254+.254-.127)	U

Cap. Code	Cap. pf	Cap. Tol.	WVDC	Cap. Code	Cap. pf	Cap. Tol.	WVDC
0R3	0.3	B, C	50	6R8	6.8	B, C, J, K, M	50
0R4	0.4	B, C	50	7R5	7.5	B, C, J, K, M	50
0R5	0.5	B, C, D	50	8R2	8.2	B, C, J, K, M	50
0R6	0.6	B, C, D	50	9R1	9.1	B, C, J, K, M	50
0R7	0.7	B, C, D	50	100	10	F, G, J, K, M	50
0R8	0.8	B, C, D	50	110	11	F, G, J, K, M	50
0R9	0.9	B, C, D	50	120	12	F, G, J, K, M	50
1R0	1.0	B, C, D	50	130	13	F, G, J, K, M	50
1R1	1.1	B, C, D	50	150	15	F, G, J, K, M	50
1R2	1.2	B, C, D	50	160	16	F, G, J, K, M	50
1R3	1.3	B, C, D	50	180	18	F, G, J, K, M	50
1R4	1.4	B, C, D	50	200	20	F, G, J, K, M	50
1R5	1.5	B, C, D	50	220	22	F, G, J, K, M	50
1R6	1.6	B, C, D	50	240	24	F, G, J, K, M	50
1R7	1.7	B, C, D	50	270	27	F, G, J, K, M	50
1R8	1.8	B, C, D	50	300	30	F, G, J, K, M	50
1R9	1.9	B, C, D	50	330	33	F, G, J, K, M	50
2R0	2.0	B, C, D	50	360	36	F, G, J, K, M	50
2R2	2.2	B, C, D	50	390	39	F, G, J, K, M	50
2R4	2.4	B, C, D	50	430	43	F, G, J, K, M	50
2R7	2.7	B, C, D	50	470	47	F, G, J, K, M	50
3R0	3.0	B, C, D	50	510	51	F, G, J, K, M	50
3R3	3.3	B, C, D	50	560	56	F, G, J, K, M	50
3R6	3.6	B, C, D	50	620	62	F, G, J, K, M	50
3R9	3.9	B, C, D	50	680	68	F, G, J, K, M	50
4R3	4.3	B, C, D	50	750	75	F, G, J, K, M	50
4R7	4.7	B, C, D	50	820	82	F, G, J, K, M	50
5R1	5.1	B, C, D	50	910	91	F, G, J, K, M	50
5R6	5.6	B, C, D	50	101	100	F, G, J, K, M	50
6R2	6.2	B, C, D	50				

* Temperature Coefficient BG (P090 ±20ppm/°C) and BP (NPO ±30ppm/°C) I.A.W. MIL-C-55681B/4 are both available in Table I values. For values greater than 100 pF, consult AVX.

Microwave MLCs

AVAILABLE CAPACITANCE/SIZE/WVDC/T.C.*

TABLE II: Case Size 13 and 14

Dimensions: Inches (Millimeters)

Case	Length	Width	Thickness	Band Width	Avail. Term.
13	.110±.020 (2.79±.508)	.110±.020 (2.79±.508)	.030/.102 (.762/2.59)	.015±.010 (.381±.254)	M, N
14	.110+.035-.020 (2.79+.889-.508)	.110±.020 (2.79±.508)	.030/.102 (.762/2.59)	.015±.010 (.381±.254)	U

Cap. Code	Cap. pf	Cap. Tol.	WVDC	Cap. Code	Cap. pf	Cap. Tol.	WVDC
0R3	0.3	B, C	500	220	22	F, G, J, K, M	500
0R4	0.4	B, C	500	240	24	F, G, J, K, M	500
0R5	0.5	B, C, D	500	270	27	F, G, J, K, M	500
0R6	0.6	B, C, D	500	300	30	F, G, J, K, M	500
0R7	0.7	B, C, D	500	330	33	F, G, J, K, M	500
0R8	0.8	B, C, D	500	360	36	F, G, J, K, M	500
0R9	0.9	B, C, D	500	390	39	F, G, J, K, M	500
1R0	1.0	B, C, D	500	430	43	F, G, J, K, M	500
1R1	1.1	B, C, D	500	470	47	F, G, J, K, M	500
1R2	1.2	B, C, D	500	510	51	F, G, J, K, M	500
1R3	1.3	B, C, D	500	560	56	F, G, J, K, M	500
1R4	1.4	B, C, D	500	620	62	F, G, J, K, M	500
1R5	1.5	B, C, D	500	680	68	F, G, J, K, M	500
1R6	1.6	B, C, D	500	750	75	F, G, J, K, M	500
1R7	1.7	B, C, D	500	820	82	F, G, J, K, M	500
1R8	1.8	B, C, D	500	910	91	F, G, J, K, M	500
1R9	1.9	B, C, D	500	101	100	F, G, J, K, M	500
2R0	2.0	B, C, D	500	111	110	F, G, J, K, M	300
2R2	2.2	B, C, D	500	121	120	F, G, J, K, M	300
2R4	2.4	B, C, D	500	131	130	F, G, J, K, M	300
2R7	2.7	B, C, D	500	151	150	F, G, J, K, M	300
3R0	3.0	B, C, D	500	161	160	F, G, J, K, M	300
3R3	3.3	B, C, D	500	181	180	F, G, J, K, M	300
3R6	3.6	B, C, D	500	201	200	F, G, J, K, M	300
3R9	3.9	B, C, D	500	221	220	F, G, J, K, M	200
4R3	4.3	B, C, D	500	241	240	F, G, J, K, M	200
4R7	4.7	B, C, D	500	271	270	F, G, J, K, M	200
5R1	5.1	B, C, D	500	301	300	F, G, J, K, M	200
5R6	5.6	B, C, D	500	331	330	F, G, J, K, M	200
6R2	6.2	B, C, D	500	361	360	F, G, J, K, M	200
6R8	6.8	B, C, J, K, M	500	391	390	F, G, J, K, M	200
7R5	7.5	B, C, J, K, M	500	431	430	F, G, J, K, M	200
8R2	8.2	B, C, J, K, M	500	471	470	F, G, J, K, M	200
9R1	9.1	B, C, J, K, M	500	511	510	F, G, J, K, M	100
100	10	F, G, J, K, M	500	561	560	F, G, J, K, M	100
110	11	F, G, J, K, M	500	621	620	F, G, J, K, M	100
120	12	F, G, J, K, M	500	681	680	F, G, J, K, M	50
130	13	F, G, J, K, M	500	751	750	F, G, J, K, M	50
150	15	F, G, J, K, M	500	821	820	F, G, J, K, M	50
160	16	F, G, J, K, M	500	911	910	F, G, J, K, M	50
180	18	F, G, J, K, M	500	102	1000	F, G, J, K, M	50
200	20	F, G, J, K, M	500				

* Temperature Coefficient BG (P090 ±20ppm/°C) and BP (NPO ±30ppm/°C) I.A.W. MIL-C-55681B/4 are both available in Table II values. For values greater than 1000 pF, consult AVX.

Microwave SLCs

GENERAL INFORMATION

SLCs are a thin film ceramic capacitor uniquely suited for stripline width matching in microwave integrated circuitry. LW sizes range from 0.010" to 0.100". Pure gold electrode metallization is standard with mechanical specifications per MIL-STD-883B.

PACKAGING

Standard Packaging is waffle pack

MECHANICAL SPECIFICATIONS (MIL-STD-883B)

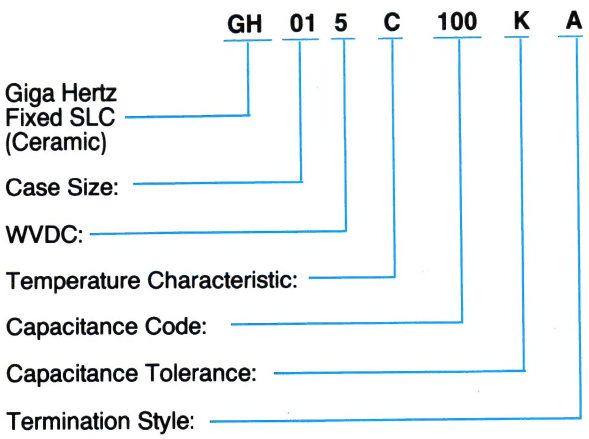
Parameter	Method	Condition
Bond Strength	2011	B
Shear Strength	2019	150 grams force

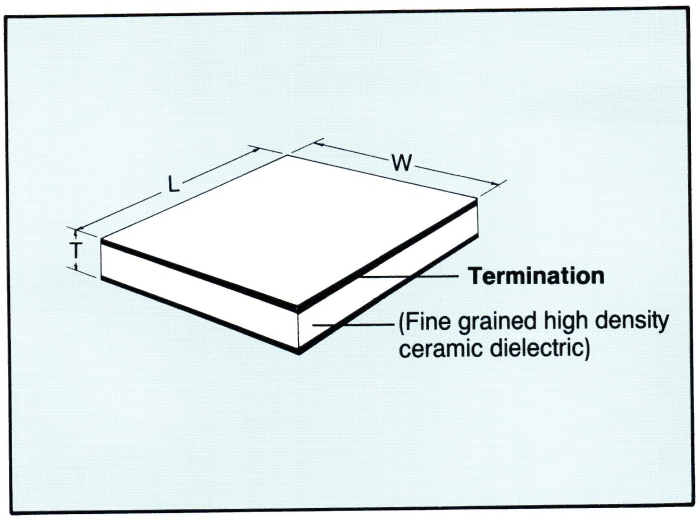
ENVIRONMENTAL SPECIFICATIONS (MIL-STD-202)

Parameter	Method	Condition
Solderability	208	—
Thermal Shock	107	B
Immersion	104	B
Moisture Resistance	106	—
Resistance to Soldering Heat	210	C

HOW TO ORDER

Part Number Example: AVX Part Number GH015C100KA





PART NUMBER CODES

Case Size, in. (mm.) Approximate Dimensions:	Size	LW	THK
	01	.015 (.381)	.005 (.127)
	02	.025 (.635)	.005 (.127)
	03	.035 (.889)	.006 (.152)
	04	.050 (1.27)	.006 (.152)
	05	.070 (1.78)	.008 (.178)
	06	.090 (2.29)	.010 (.254)

WVDC: 5= 50, 1 = 100

Temperature Characteristic: A = NPO (-55°C to +125°C), C = ±15% (-55°C to +125°C), E = +22 -56% (+10°C to +85°C)

Capacitance Code: 0R1 = 0.1 pF, 1R0 = 1.0 pF, 100 = 10 pF, 101 = 100 pF, 102 = 1000 pF

Capacitance Tolerance: B = ±0.1 pF, C = ±0.25 pF, D = ±0.5 pF, J = ±5%, K = ±10%, M = ±20%, Z = +80 -20%

Termination: A = 99.999% pure gold sputtered electrode -2.0 microns minimum over barrier layer.

ELECTRICAL PARAMETERS

Type	A	C	E
D. F. (Max)	0.10% to 0.3%[1]	2.5%[2]	3%[3]
Temp. Range	-55°C to +125°	-55°C to +125°	See page 8 for details
Temp. Char.	NPO±30 ppm/°C	±15%	
I.R. +25°C	10^6 megohms	10^5 megohms	10^5 megohms
I.R. upper range	10^5 megohms	10^4 megohms	10^4 megohms
WVDC (typical)	50 & 100 VDC	50 & 100 VDC	50 & 100 VDC
DWV Flash (min)	250% rated WVDC		
Cap Range (pF)	0.1 to 18[1]	5.1 to 750[2]	47 to 2400[3]
Life Test (typical)	2 × rated VDC for 2000 hours at upper limit temperature range		

Note 1: 1 MHz with 1.0 VRMS
Note 2: 1 KHz with 1.0 VRMS
Note 3: 1 KHz with 0.5 VRMS

Microwave SLCs

NOMINAL SIZE, CAPACITANCE (pf) AND TOLERANCE SPECIFICATIONS

Class I Stable High Q Temperature Characteristic A (NPO ± 30 ppm/°C) Dimensions: Inches (Millimeters)

AVX Style	GH01	GH02	GH03	GH04	GH05	GH06
(L) Length	.015 (.381)	.025 (.635)	.035 (.889)	.050 (1.27)	.070 (1.78)	.090 (2.29)
(W) Width	.015 (.381)	.025 (.635)	.035 (.889)	.050 (1.27)	.070 (1.78)	.090 (2.29)
(LW) Tol.	±.005 (1.27)	±.005 (1.27)	±.005 (1.27)	±.010 (.254)	±.010 (.254)	±.010 (.254)
(T) Thickness	.005 (.127)	.005 (.127)	.006 (.152)	.006 (.152)	.008 (.178)	.010 (.254)
(T) Tol.	±.002 (.051)	±.002 (.051)	±.002 (.051)	±.002 (.051)	±.003 (.076)	±.005 (.127)

Cap. pf	Cap. Code	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.
.1	0R1	B					
.3	0R3	B, C	B,C				
.5	0R5	B, C	B,C				
1.0	1R0	B, C, D	B, C, D				
1.2	1R2	B, C, D	B, C, D				
1.5	1R5		B, C, D	B, C, D			
2.2	2R2		B, C, D	B, C, D			
2.4	2R4		B, C, D	B, C, D			
2.7	2R7		B, C, D	B, C, D			
3.3	3R3			B, C, D			
3.9	3R9			B, C, D			
4.7	4R7			B, C, D	C, D		
5.1	5R1			B, C, D	C, D		
5.6	5R6				C, D		
6.8	6R8				D, K	D, K	
8.2	8R2				D, K	D, K	
10	100					J, K	J, K
12	120					J, K	J, K
15	150						J, K
18	180						J, K

Microwave SLCs

NOMINAL SIZE, CAPACITANCE (pf) AND TOLERANCE SPECIFICATIONS

Class II Mid K Range Temperature Characteristic C (see below) Dimensions: Inches (Millimeters)

AVX Style	GH01	GH02	GH03	GH04	GH05	GH06
(L) Length	.015 (.381)	.025 (.635)	.035 (.889)	.050 (1.27)	.070 (1.78)	.090 (2.29)
(W) Width	.015 (.381)	.025 (.635)	.035 (.889)	.050 (1.27)	.070 (1.78)	.090 (2.29)
(LW) Tol.	±.005 (.127)	±.005 (.127)	±.005 (.127)	±.010 (.254)	±.010 (.254)	±.010 (.254)
(T) Thickness	.005 (.127)	.005 (.127)	.006 (.152)	.006 (.152)	.008 (.178)	.010 (.254)
(T) Tol.	±.002 (.051)	±.002 (.051)	±.002 (.051)	±.002 (.051)	±.003 (.076)	±.005 (.127)

Cap. pf	Cap. Code	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.
5.1	5R1	K,M					
5.6	5R6	K,M					
6.8	6R8	K,M					
8.2	8R2	K,M					
10	100	K,M					
12	120	K,M					
15	150	K,M					
18	180	K,M					
20	200	K,M	K,M				
25	250	K,M	K,M				
30	300	K,M	K,M				
36	360	K,M	K,M				
40	400	K,M	K,M				
47	470	K,M	K,M	K,M			
51	510		K,M	K,M			
56	560		K,M	K,M			
68	680		K,M	K,M	K,M		
75	750		K,M	K,M	K,M		
82	820		K,M	K,M	K,M		
100	101		K,M	K,M	K,M	K,M	
120	121			K,M	K,M	K,M	
150	151			K,M	K,M	K,M	
220	221				K,M	K,M	K,M
270	271				K,M	K,M	K,M
330	331				K,M	K,M	K,M
390	391					K,M	K,M
470	471					K,M	K,M
560	561					K,M	K,M
620	621						K,M
680	681						K,M
750	751						K,M

*Maximum Capacitance change from -55°C to +125°C is ±15%.

Microwave SLCs

NOMINAL SIZE, CAPACITANCE (pf) AND TOLERANCE SPECIFICATIONS

Class II High K Range Temperature Characteristic E (see Notes 1 and 2)

Dimensions: Inches (Millimeters)

AVX Style	GH01	GH02	GH03	GH04	GH05	GH06
(L) Length	.015 (.381)	.025 (.635)	.035 (.889)	.050 (1.27)	.070 (1.78)	.090 (2.29)
(W) Width	.015 (.381)	.025 (.635)	.035 (.889)	.050 (1.27)	.070 (1.78)	.090 (2.29)
(LW) Tol.	±.005 (1.27)	±.005 (1.27)	±.005 (1.27)	±.010 (.254)	±.010 (.254)	±.010 (.254)
(T) Thickness	.005 (.127)	.005 (.127)	.006 (.152)	.006 (.152)	.008 (.178)	.010 (.254)
(T) Tol.	±.002 (.051)	±.002 (.051)	±.002 (.051)	±.002 (.051)	±.003 (.076)	±.005 (.127)

Cap. pf	Cap. Code	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.	Cap. Tol. Avail.
47	470	K, M, Z (1)					
51	510	K, M, Z (1)					
56	560	K, M, Z (1)					
68	680	K, M, Z (1)					
75	750	K, M, Z (1)					
82	820	K, M, Z (1)					
100	101	K, M, Z (1)					
120	121	K, M, Z (1)					
150	151		K, M, Z (1)				
220	221		K, M, Z (1)				
270	271		K, M, Z (1)				
330	331		M, Z (2)	K, M, Z (1)			
390	391			K, M, Z (1)			
470	471			K, M, Z (1)			
560	561			M, Z (2)	K, M, Z (1)		
680	681				K, M, Z (1)		
750	751				K, M, Z (1)		
820	821				M, Z (2)		
1000	102				M, Z (2)	K, M, Z (1)	
1200	122					K, M, Z (1)	
1500	152					M, Z (2)	K, M, Z (1)
1800	182					M, Z (2)	K, M, Z (1)
2000	202						K, M, Z (1)
2400	242						M, Z (2)

Note 1: Capacitance Tolerance Groups K,M,Z Maximum Capacitance Change +22, -56% from -55°C to +125°C

Note 2: Capacitance Tolerance Groups M,Z Maximum Capacitance Change +22, -56% from +10°C to +85°C
+22, -82% from -55°C to +125°C

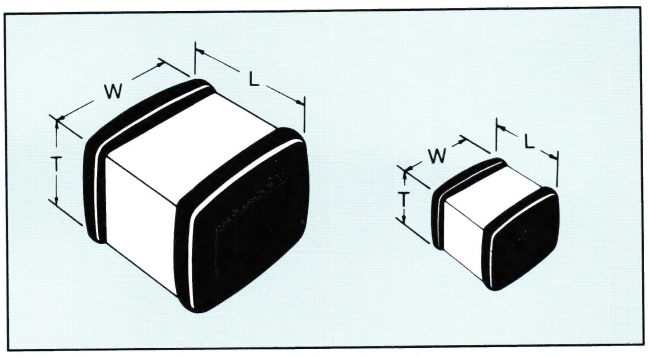
MIL-C-55681/4B-
RF/Microwave Chips- Established Reliability

MILITARY DESIGNATION PER MIL-C-55681

Part Number Example

(example) CDR12 BG 101 A K U M

- MIL Style
- Voltage-temperature Limits
- Capacitance
- Rated Voltage
- Capacitance Tolerance
- Termination Finish
- Failure Rate



MIL Style: CDR11, CDR12, CDR13, CDR14

Voltage Temperature Limits:
BG = P090 ± 20 ppm/°C with and without rated voltage from -55°C to +125°C

BP = 0±30 ppm/°C with and without rated voltage from -55°C to +125°C

Capacitance:
Two digit figures followed by multiplier (number of zeros to be added), e.g., 101 = 100 pF

Rated Voltage: A = 50V, B = 100V, C = 200V, D = 300V, E = 500V

Capacitance Tolerance:
C = ±.25 pF, D = ±.5 pF, B = ±.1 pF, F = ±1%, G = ±2%
J = ±5%, K = ±10%, M = ±20%

Termination Finish (Military Designations):
- M = Palladium/Silver
- N = Silver, Nickel, Gold
- S = Solder Coated, Final
- U = Base Metalization, Barrier Metal, Solder Coated. (Solder M.P. 200°C or less)
- W = Base Metalization, Barrier Metal, Tinned (Tin or Tin/Lead Alloy)

Failure Rate Level: Contact AVX for latest failure rate available

Packaging: Bulk, Waffle, Tape & Reel per EIR RS 481

CROSS REFERENCE: AVX/MIL-C-55681/4B

Per MIL-C-55681	AVX Style	Length (L)	Width (W)	Thickness (T)		D		Termination Band (TB)	
				Max.	Min.	Max.	Min.	Max.	Min.
CDR11	AQ11	.055 ±.015	.055 ±.015	.057	.020	—	.015	.020	.005
CDR12	AQ12	.055 ±.025	.055 ±.015	.057	.020	—	.015	.020	.005
CDR13	AQ13	.110 ±.020	.110 ±.020	.102	.030	—	.015	.025	.005
CDR14	AQ14	.110 $^{+.035}_{-.020}$	.110 ±.020	.102	.030	—	.015	.025	.005

MIL-C-55681/4B- RF/Microwave Chips- Established Reliability

TABLE I. Styles CDR11 and CDR12 capacitor characteristics.

Type Designation 1/	Capacitance in pf*	Capacitance tolerance	Rated temperature and V/Temperature	RVDC
CDR1-B-0R1AB--	0.1	B	BG, BP	50
CDR1-B-0R2AB--	0.2	B	BG, BP	50
CDR1-B-0R3A---	0.3	B,C	BG, BP	50
CDR1-B-0R4A---	0.4	B,C	BG, BP	50
CDR1-B-0R5A---	0.5	B,C,D	BG, BP	50
CDR1-B-0R6A---	0.6	B,C,D	BG, BP	50
CDR1-B-0R7A---	0.7	B,C,D	BG, BP	50
CDR1-B-0R8A---	0.8	B,C,D	BG, BP	50
CDR1-B-0R9A---	0.9	B,C,D	BG, BP	50
CDR1-B-1R0A---	1.0	B,C,D	BG, BP	50
CDR1-B-1R1A---	1.1	B,C,D	BG, BP	50
CDR1-B-1R2A---	1.2	B,C,D	BG, BP	50
CDR1-B-1R3A---	1.3	B,C,D	BG, BP	50
CDR1-B-1R4A---	1.4	B,C,D	BG, BP	50
CDR1-B-1R5A---	1.5	B,C,D	BG, BP	50
CDR1-B-1R6A---	1.6	B,C,D	BG, BP	50
CDR1-B-1R7A---	1.7	B,C,D	BG, BP	50
CDR1-B-1R8A---	1.8	B,C,D	BG, BP	50
CDR1-B-1R9A---	1.9	B,C,D	BG, BP	50
CDR1-B-2R0A---	2.0	B,C,D	BG, BP	50
CDR1-B-2R1A---	2.1	B,C,D	BG, BP	50
CDR1-B-2R2A---	2.2	B,C,D	BG, BP	50
CDR1-B-2R4A---	2.4	B,C,D	BG, BP	50
CDR1-B-2R7A---	2.7	B,C,D	BG, BP	50
CDR1-B-3R0A---	3.0	B,C,D	BG, BP	50
CDR1-B-3R3A---	3.3	B,C,D	BG, BP	50
CDR1-B-3R6A---	3.6	B,C,D	BG, BP	50
CDR1-B-3R9A---	3.9	B,C,D	BG, BP	50
CDR1-B-4R3A---	4.3	B,C,D	BG, BP	50
CDR1-B-4R7A---	4.7	B,C,D	BG, BP	50
CDR1-B-5R1A---	5.1	B,C,D	BG, BP	50
CDR1-B-5R6A---	5.6	B,C,D	BG, BP	50
CDR1-B-6R2A---	6.2	B,C,D	BG, BP	50
CDR1-B-6R8A---	6.8	B,C,J,K,M	BG, BP	50
CDR1-B-7R5A---	7.5	B,C,J,K,M	BG, BP	50
CDR1-B-8R2A---	8.2	B,C,J,K,M	BG, BP	50
CDR1-B-9R1A---	9.1	B,C,J,K,M	BG, BP	50
CDR1-B-100A---	10	F,G,J,K,M	BG, BP	50
CDR1-B-110A---	11	F,G,J,K,M	BG, BP	50
CDR1-B-120A---	12	F,G,J,K,M	BG, BP	50
CDR1-B-130A---	13	F,G,J,K,M	BG, BP	50
CDR1-B-150A---	15	F,G,J,K,M	BG, BP	50
CDR1-B-160A---	16	F,G,J,K,M	BG, BP	50
CDR1-B-180A---	18	F,G,J,K,M	BG, BP	50
CDR1-B-200A---	20	F,G,J,K,M	BG, BP	50
CDR1-B-220A---	22	F,G,J,K,M	BG, BP	50
CDR1-B-240A---	24	F,G,J,K,M	BG, BP	50
CDR1-B-270A---	27	F,G,J,K,M	BG, BP	50
CDR1-B-300A---	30	F,G,J,K,M	BG, BP	50
CDR1-B-330A---	33	F,G,J,K,M	BG, BP	50
CDR1-B-360A---	36	F,G,J,K,M	BG, BP	50
CDR1-B-390A---	39	F,G,J,K,M	BG, BP	50
CDR1-B-430A---	43	F,G,J,K,M	BG, BP	50
CDR1-B-470A---	47	F,G,J,K,M	BG, BP	50
CDR1-B-510A---	51	F,G,J,K,M	BG, BP	50
CDR1-B-560A---	56	F,G,J,K,M	BG, BP	50
CDR1-B-620A---	62	F,G,J,K,M	BG, BP	50
CDR1-B-680A---	68	F,G,J,K,M	BG, BP	50
CDR1-B-750A---	75	F,G,J,K,M	BG, BP	50
CDR1-B-820A---	82	F,G,J,K,M	BG, BP	50
CDR1-B-910A---	91	F,G,J,K,M	BG, BP	50
CDR1-B-101A---	100	F,G,J,K,M	BG, BP	50

1/ Complete type designation will include additional symbols to indicate style, voltage-temperature limits, capacitance tolerance (where applicable), termination finish ("M" or "N" for style CDR11, and "S", "U" or "W" for style CDR12) and failure rate level.

1/ See footnote at end of table.

*Full range of capacitance is available in either CDR11 or CDR12 sizes, according to MIL-C-55681/4. Consult AVX for details.

MIL-C-55681/4B- RF/Microwave Chips- Established Reliability

TABLE II. Styles CDR13 and CDR14 capacitor characteristics.

Type Designation 1/	Capacitance in pf	Capacitance tolerance	Rated temperature and V/Temperature	RVDC
CDR1-B-0R1EB--	0.1	B	BG, BP	500
CDR1-B-0R2EB--	0.2	B	BG, BP	500
CDR1-B-0R3E---	0.3	B,C	BG, BP	500
CDR1-B-0R4E---	0.4	B,C	BG, BP	500
CDR1-B-0R5E---	0.5	B,C,D	BG, BP	500
CDR1-B-0R6E---	0.6	B,C,D	BG, BP	500
CDR1-B-0R7E---	0.7	B,C,D	BG, BP	500
CDR1-B-0R8E---	0.8	B,C,D	BG, BP	500
CDR1-B-0R9E---	0.9	B,C,D	BG, BP	500
CDR1-B-1R0E---	1.0	B,C,D	BG, BP	500
CDR1-B-1R1E---	1.1	B,C,D	BG, BP	500
CDR1-B-1R2E---	1.2	B,C,D	BG, BP	500
CDR1-B-1R3E---	1.3	B,C,D	BG, BP	500
CDR1-B-1R4E---	1.4	B,C,D	BG, BP	500
CDR1-B-1R5E---	1.5	B,C,D	BG, BP	500
CDR1-B-1R6E---	1.6	B,C,D	BG, BP	500
CDR1-B-1R7E---	1.7	B,C,D	BG, BP	500
CDR1-B-1R8E---	1.8	B,C,D	BG, BP	500
CDR1-B-1R9E---	1.9	B,C,D	BG, BP	500
CDR1-B-2R0E---	2.0	B,C,D	BG, BP	500
CDR1-B-2R1E---	2.1	B,C,D	BG, BP	500
CDR1-B-2R2E---	2.2	B,C,D	BG, BP	500
CDR1-B-2R4E---	2.4	B,C,D	BG, BP	500
CDR1-B-2R7E---	2.7	B,C,D	BG, BP	500
CDR1-B-3R0E---	3.0	B,C,D	BG, BP	500
CDR1-B-3R3E---	3.3	B,C,D	BG, BP	500
CDR1-B-3R6E---	3.6	B,C,D	BG, BP	500
CDR1-B-3R9E---	3.9	B,C,D	BG, BP	500
CDR1-B-4R3E---	4.3	B,C,D	BG, BP	500
CDR1-B-4R7E---	4.7	B,C,D	BG, BP	500
CDR1-B-5R1E---	5.1	B,C,D	BG, BP	500
CDR1-B-5R6E---	5.6	B,C,D	BG, BP	500
CDR1-B-6R2E---	6.2	B,C,D	BG, BP	500
CDR1-B-6R8E---	6.8	B,C,J,K,M	BG, BP	500
CDR1-B-7R5E---	7.5	B,C,J,K,M	BG, BP	500
CDR1-B-8R2E---	8.2	B,C,J,K,M	BG, BP	500
CDR1-B-9R1E---	9.1	B,C,J,K,M	BG, BP	500
CDR1-B-100E---	10	F,G,J,K,M	BG, BP	500
CDR1-B-110E---	11	F,G,J,K,M	BG, BP	500
CDR1-B-120E---	12	F,G,J,K,M	BG, BP	500
CDR1-B-130E---	13	F,G,J,K,M	BG, BP	500
CDR1-B-150E---	15	F,G,J,K,M	BG, BP	500
CDR1-B-160E---	16	F,G,J,K,M	BG, BP	500
CDR1-B-180E---	18	F,G,J,K,M	BG, BP	500
CDR1-B-200E---	20	F,G,J,K,M	BG, BP	500
CDR1-B-220E---	22	F,G,J,K,M	BG, BP	500
CDR1-B-240E---	24	F,G,J,K,M	BG, BP	500
CDR1-B-270E---	27	F,G,J,K,M	BG, BP	500
CDR1-B-300E---	30	F,G,J,K,M	BG, BP	500
CDR1-B-330E---	33	F,G,J,K,M	BG, BP	500
CDR1-B-360E---	36	F,G,J,K,M	BG, BP	500
CDR1-B-390E---	39	F,G,J,K,M	BG, BP	500
CDR1-B-430E---	43	F,G,J,K,M	BG, BP	500
CDR1-B-470E---	47	F,G,J,K,M	BG, BP	500
CDR1-B-510E---	51	F,G,J,K,M	BG, BP	500

Type Designation 1/	Capacitance in pf*	Capacitance tolerance	Rated temperature and V/Temperature	RVDC
CDR1-B-560E---	56	F,G,J,K,M	BG, BP	500
CDR1-B-620E---	62	F,G,J,K,M	BG, BP	500
CDR1-B-680E---	68	F,G,J,K,M	BG, BP	500
CDR1-B-750E---	75	F,G,J,K,M	BG, BP	500
CDR1-B-820E---	82	F,G,J,K,M	BG, BP	500
CDR1-B-910E---	91	F,G,J,K,M	BG, BP	500
CDR1-B-101E---	100	F,G,J,K,M	BG, BP	500
CDR1-B-111D---	110	F,G,J,K,M	BG, BP	300
CDR1-B-121D---	120	F,G,J,K,M	BG, BP	300
CDR1-B-131D---	130	F,G,J,K,M	BG, BP	300
CDR1-B-151D---	150	F,G,J,K,M	BG, BP	300
CDR1-B-161D---	160	F,G,J,K,M	BG, BP	300
CDR1-B-181D---	180	F,G,J,K,M	BG, BP	300
CDR1-B-201D---	200	F,G,J,K,M	BG, BP	300
CDR1-B-221C---	220	F,G,J,K,M	BG, BP	200
CDR1-B-241C---	240	F,G,J,K,M	BG, BP	200
CDR1-B-271C---	270	F,G,J,K,M	BG, BP	200
CDR1-B-301C---	300	F,G,J,K,M	BG, BP	200
CDR1-B-331C---	330	F,G,J,K,M	BG, BP	200
CDR1-B-361C---	360	F,G,J,K,M	BG, BP	200
CDR1-B-391C---	390	F,G,J,K,M	BG, BP	200
CDR1-B-431C---	430	F,G,J,K,M	BG, BP	200
CDR1-B-471C---	470	F,G,J,K,M	BG, BP	200
CDR1-B-511B---	510	F,G,J,K,M	BG, BP	100
CDR1-B-561B---	560	F,G,J,K,M	BG, BP	100
CDR1-B-621B---	620	F,G,J,K,M	BG, BP	100
CDR1-B-681A---	680	F,G,J,K,M	BG, BP	50
CDR1-B-751A---	750	F,G,J,K,M	BG, BP	50
CDR1-B-821A---	820	F,G,J,K,M	BG, BP	50
CDR1-B-911A---	910	F,G,J,K,M	BG, BP	50
CDR1-B-102A---	1000	F,G,J,K,M	BG, BP	50

1/ Complete type designation will include additional symbols to indicate style, voltage-temperature limits, capacitance tolerance (where applicable), termination finish ("M" or "N" for style CDR13, and "S", "U" or "W" for style CDR14) and failure rate level.

1/ See footnote at end of table.

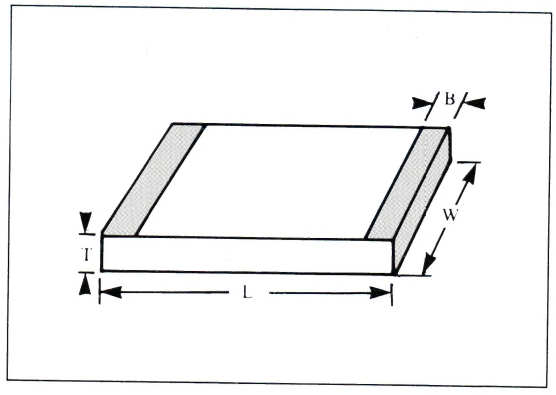
*Full range of capacitance is available in either CDR13 or CDR14 sizes, according to MIL-C-55681/4. Consult AVX for details.

ACCU-F

GENERAL INFORMATION

—ACCU-F is a special design of AVX's AccuGuard® to meet the fast growing demand for low-loss (high-Q) chip capacitors for use in Surface Mount Technology (SMT), for the mobile communications market, including cellular radio at 450 MHz, 900 MHz.

—4 years of intensive R & D work into the application of highly sophisticated semiconductor technology led to the AccuGuard ranges of thin-film capacitors and the special high frequency Accu-F design:



SIZE SPECIFICATIONS

Standard sizes—inches (mm)

	0505	0805	1210
L	.055±.004 (1.40±.10)	.082±.004 (2.08±.10)	.128±.004 (3.25±.10)
W	.045±.004 (1.14±.10)	.062±.004 (1.57±.10)	.110±.004 (2.79±.10)
T*	.027±.004 (.69±.10)	.035±.004 (.89±.10)	.035±.004 (.89±.10)
B**	.010±.004 (.25±.10)	.017±.004 (.43±.10)	.017±.004 (.43±.10)

*Other thicknesses are available upon request.
**Termination on 3 sides only.

ACCU-F

The use of very low-loss dielectric materials (SiO_2) and Si_3N_4) in conjunction with highly conductive electrode metals (aluminum and copper) manufactured under class 100 clean room facilities results in low ESR, high Q, and low-capacitance-change capacitors, operating at frequencies up to 1000 MHz and beyond. These high-frequency characteristics usually change at a slower rate with increasing frequency than for ceramic microwave capacitors. As a result the frequency response, even in the 500-1000 MHz region, is superb.

Because of the thin-film technology, the above-mentioned frequency characteristics are obtained without any compromise of properties required for SMT.

The main ACCU-F properties are:

—Internationally agreed sizes and any custom-required sizes (subject to tooling time and charge), all with excellent dimensional control, typically ±.001" (25.4 μm).

—Small size chip capacitors (e.g. 0603, 0403) are equally available.

—Tight capacitance tolerances are available (±.1 pF).

—High Q and low ESR at frequencies up to 1 GHz and beyond. Loss-level of frequency response can be adjusted according to specific requirements.

—Ultra-stability with respect to time, temperature, frequency and voltage variation.

—Nickel/solder coated terminations to provide excellent solderability and leach resistance.

HOW TO ORDER

Part Number Example

1210 5K 560 G A W XXX R

Size Code
Voltage Code
Dielectric Code
Capacitance Code
Tolerance Code
Specification Code
Termination Code
Thickness
Packaging Code

Part Number Codes

Size: See above for standard available sizes.

Voltage: 5=50 VDC, 1=100 VDC

Dielectric: K=ACCU-F, 0±60ppm/°C (-55°C +125°C)

Capacitance: Capacitance expressed in pF, 2 significant digits + number of zeros. For values <10 pF, letter R denotes decimal point, e.g., 68 pF = 680, 8.2 pF = 8R2.

Tolerance: B=±.1 pF, C=±.25 pF, D=±.5 pF, F=±1%, G=±2%, H=±3%, J=±5% (subject to limits under "cap ranges")

Specification: A =Commercial standard

Termination: W=AccuGuard nickel/solder coated

Thickness: As per dimensions table, or non-standard if required, in thousandths of an inch; e.g., 035.

Packaging: TR = Tape and reel (optional)

ACCU-F

CAPACITANCE SPECIFICATIONS

RATED VOLTAGE*	0505	0805	1210	Minimum capacitance tolerance:
50V	.5≤C≤35	.5≤C≤62	.5≤C≤250	±.01
100V	.5≤C≤8.7	.5≤C≤15	.5≤C≤68	±.01

Preferred Capacitance values (pF):
C <1pF: .5, .6, .7, .8, .9
C >1pF: E12 values
(1.0, 1.2, 1.5, 1.8, 2.2, 2.7, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2, 10, etc.)

MECHANICAL SPECIFICATIONS

Leach Resistance — (260°C, 2 minutes immersion).

Solderability — MIL-STD 202, method 208
(260°C, in/out at 1"/Sec, 3 Sec. dwell, 90% coverage).

Storage — Greater than 1 year in original package and normal storage conditions.

ELECTRICAL SPECIFICATIONS

Operating Temperature — -55²°C +125°C

Temperature Coefficient — 0±60ppm/°C (COH or IF)

Capacitance Measurement — 1 MHz, 1 Vrms (Max.)

Voltage Rating — 50 VDC, 100 VDC

Quality Factor and ESR — Typical performance characteristics

Insulation Resistance — More than 100,000MΩ

Dielectric Withstanding Voltage — 250% rated voltage for 5 sec.

Life Test — MIL-STD 202, method 108
(125°C, 2 × RV, 1000 hours)

Load Humidity (85/85/RV) — MIL-STD 202, method 103 at 85% RH,
85°C, rated voltage, 1000 hours

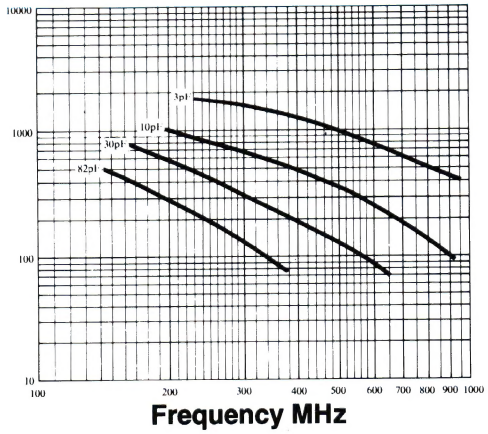
Thermal Shock — 10 cycles of: 3s in solder 250°C
3s in air
3s in cold water
without changes physically or in C, Q, IR.

Immersion — MIL-STD 202, method 104, Cond. B

1 MHz	Q up to 10,000
200 MHz	Q up to 2,000
450 MHz	Q up to 1,100
700 MHz	Q up to 700
900 MHz	Q up to 500

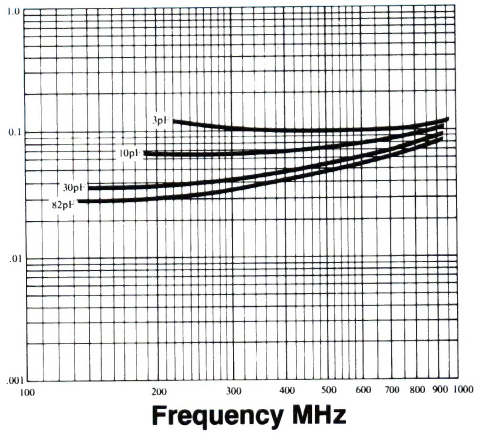
PERFORMANCE CHARACTERISTICS—Typical "Q & ESR" (0805)

"Q"



Frequency MHz

"ESR"



Frequency MHz

NOTE:
Q/ESR/C measurements at VHF/UHF to 1 GHz are carried out on each production lot.
Samples and test data are retained at the factory for each batch.

The Q/ESR figures given in this data sheet were measured on the Boonton Model 34A resonant coaxial line system (EIA Standard RS483).

AUTOMATED INSERTION PACKAGING

TAPE & REEL: All tape and reel specifications are in compliance with EIA RS481 (equivalent to IEC 286 part 3).

Sizes 0504, 0505, 0805, 1110, 1210 (Note: SLCs not available with T & R)

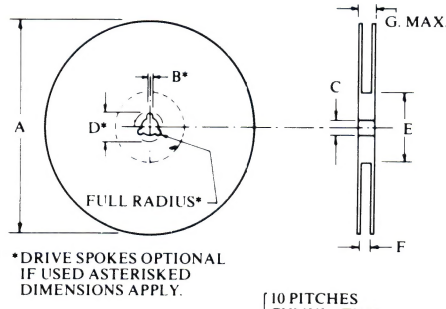
—8mm carrier

—7" reel-range from 2,500-4,000 per reel (size 1210 limited to 2,500 pcs. per reel) dependent on chip thickness (parts thicker than 1mm will be packaged 2,500 per reel)

Reel Dimension mm (inches)

A	B	C	D	E	F	G
178±2.0 (7.00±0.079)	2.0 (0.079)	13±0.5 (0.512±0.020)	20.2 MIN. (0.795 MIN.)	50 MIN. (1.969 MIN.)	10.0±1.5 (0.394±0.050)	14.9 (0.587)

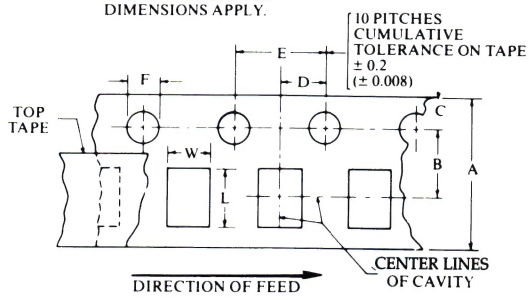
Metric dimensions will govern.
English measurements rounded and for reference only.



Carrier Dimensions mm (inches)

A	B	C	D	E	F
8.0±0.3 (0.315±0.012)	3.5±0.05 (0.138±0.002)	1.75±0.1 (0.069±0.004)	2.0±0.05 (0.079±0.002)	4.0±0.1 (0.157±0.004)	$1.5^{+0.1}_{-0.0}$ $0.059^{+0.004}_{-0.000}$

Note: The nominal dimensions of the component compartment are derived from the component size.



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